



10 CFR 50.54(f)

RS-14-055

March 12, 2014

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555

LaSalle County Station, Units 1 and 2
Facility Operating License Nos. NPF-11 and NPF-18
NRC Docket Nos. 50-373 and 50-374

Subject: Exelon Generation Company, LLC Response to March 12, 2012, Request for Information Enclosure 2, Recommendation 2.1, Flooding, Required Response 2, Flood Hazard Reevaluation Report

References:

1. NRC Letter, Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Recommendations 2.1, 2.3, and 9.3, of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident; dated March 12, 2012.
2. NRC Letter, Prioritization of Response Due Dates for Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Flooding Hazard Reevaluations for Recommendations 2.1 of the Near-Term Task Force Review of Insights From the Fukushima Dai-ichi Accident, dated May 11, 2012.
3. U.S. Nuclear Regulatory Commission, NUREG/CR-7046, "Design-Basis Flood Estimation for Site Characterization at Nuclear Power Plants in the United States of America", dated November 2011.
4. Letter from David L. Skeen, U.S. Nuclear Regulatory Commission, to Joseph E. Pollock, Nuclear Energy Institute – "Trigger Conditions for Performing an Integrated Assessment and Due Date for Response", dated December 3, 2012.
5. U.S. Nuclear Regulatory Commission, JLD-ISG-2012-05, "Guidance for Performing the Integrated Assessment for External Flooding", dated November 30, 2012.
6. Letter from Exelon Generation Company, LLC to U.S. Nuclear Regulatory Commission, "180-day Response to NRC Request for Information Pursuant to 10 CFR 50.54(f) Regarding the Flooding Aspects of Recommendation 2.3 of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident," dated November 27, 2012 (RS-12-164) (LaSalle County Station, Units 1 and 2).
7. LaSalle County Station, Procedure LOA-FLD-001, "Flooding," Revision 16.

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8. NRC Letter, Endorsement of Nuclear Energy Institute (NEI) 12-07, "Guidelines For Performing Verification Walkdowns of Plant Flood Protection Features," dated May 31, 2012

On March 12, 2012, the NRC issued Reference 1 to request information associated with Near-Term Task Force (NTTF) Recommendation 2.1 for Flooding. One of the Required Responses in this letter directed licensees to submit a Flood Hazard Reevaluation Report (FHRR), including the interim action plan requested in Item 1.d of Reference 1, Enclosure 2, if appropriate. On May 11, 2012, the NRC issued the prioritization plan developed by the NRC and resultant Flood Hazard Reevaluation due dates for all sites. Reference 2, Enclosure 1 identified LaSalle County Station, Units 1 and 2, as a Category 2 Site requiring a Flood Hazard Reevaluation Report submittal due date of March 12, 2014. The information in the enclosed provides LaSalle County Station, Units 1 and 2 Flooding Hazard Reevaluation Report. The LaSalle County Station, Units 1 and 2 Flood Hazard Reevaluation Report follows the reevaluation process described in Reference 3.

Information Requested in Reference 1, Enclosure 2

- a. **Site information related to the flood hazard. Relevant SSCs important to safety and the UHS are included in the scope of this reevaluation, and pertinent data concerning these SSCs should be included. Other relevant site data includes the following:**
 - i. **Detailed site information (both designed and as-built), including present-day site layout, elevation of pertinent SSCs important to safety, site topography, as well as pertinent spatial and temporal data sets;**

Response:

- Site layout and topography – See Section 2.1 and Figures 2.1.1 and 2.1.2 of Enclosure 1.
- Pertinent Site Data is provided in Enclosure 2.

- ii. **Current design basis flood elevations for all flood causing mechanisms;**

Response:

- See Section 2.2 of Enclosure 1, which describes the current design basis flood hazards for all flood causing mechanisms.

- iii. **Flood-related changes to the licensing basis and any flood protection changes (including mitigation) since license issuance;**

Response:

- See Section 2.3 of Enclosure 1 for a description of flood-related changes to the licensing basis and any flood protection changes (including mitigation) since license issuance.

iv. Changes to the watershed and local area since license issuance;

Response:

- See Section 2.4 of Enclosure 1 for a description of changes to the watershed and local area since license issuance.

v. Current licensing basis flood protection and pertinent flood mitigation features at the site;

Response:

- See Section 2.5 of Enclosure 1 for a description of Current License Basis (CLB) flood protection and pertinent flood mitigation features at the site.

vi. Additional site details, as necessary, to assess the flood hazard (i.e., bathymetry, walkdown results, etc.)

Response:

- See Reference 6 for results of the flooding walkdowns.
- See Section 3 of Enclosure 1 for additional site and watershed information used to assess the flood hazard.

b. Evaluation of the flood hazard for each flood causing mechanism, based on present-day methodologies and regulatory guidance. Provide an analysis of each flood causing mechanism that may impact the site including local intense precipitation and site drainage, flooding in streams and rivers, dam breaches and failures, storm surge and seiche, tsunami, channel migration or diversion, and combined effects. Mechanisms that are not applicable at the site may be screened-out; however, a justification should be provided. Provide a basis for inputs and assumptions, methodologies and models used including input and output files, and other pertinent data.

Response:

A description of the flood hazard reevaluation for each flood-causing mechanism and the basis for inputs, assumptions, methodologies, and models are referenced below. Per NRC/NEI public meeting dated January 16, 2013, input-output files are not included with this submittal package but are available upon request.

- Local Intense Precipitation (LIP) and Site Drainage: See Section 3.1 of Enclosure 1.
- Flooding in Streams and Rivers: See Sections 3.2 and 3.7 of Enclosure 1.
- Dam Breaches and Failures: See Sections 3.2, 3.4 and 3.7 of Enclosure 1.

- Storm Surge: See Section 3.3 of Enclosure 1.
- Seiche: See Section 3.3 of Enclosure 1.
- Tsunami: See Section 3.8 of Enclosure 1.
- Ice-Induced Flooding: See Section 3.5 of Enclosure 1.
- Channel Migration or Diversion: See Section 3.6 of Enclosure 1.
- Combined Effects (including wind-waves and runup effects): See Section 3.4 of Enclosure 1.
- Other Associated Effects (i.e. hydrodynamic loading, including debris; effects caused by sediment deposition and erosion; concurrent site conditions; and groundwater ingress) are addressed in the respective sections in Enclosure 1 for the applicable flood-causing mechanisms and combined-effect floods.
- Flood Event Duration Parameters (i.e. warning time, period of site preparation, period of inundation, and period of recession) are addressed in the respective sections in Enclosure 1 for the applicable flood-causing mechanisms and combined-effect floods.
- Error/Uncertainty analysis for the governing flood scenarios is addressed in the respective sections in Enclosure 1.

- c. Comparison of current and reevaluated flood causing mechanisms at the site. Provide an assessment of the current design basis flood elevation to the reevaluated flood elevation for each flood causing mechanism. Include how the findings from Enclosure 4 of the 50.54(f) letter (i.e., Recommendation 2.3 flooding walkdowns) support this determination. If the current design basis flood bounds the reevaluated hazard for all flood causing mechanisms, include how this finding was determined.**

Response:

The current design basis flood does not bound the reevaluated hazard for all applicable flood-causing mechanisms, combined-effect floods, associated effects, and/or flood event duration parameters. A complete comparison of current design basis and reevaluated flood hazards is provided in Section 4 of Enclosure 1. The summary below describes how this finding was determined for the applicable flood hazards. The Illinois River (and associated upstream dam failure) flooding, tsunami, ice-induced flooding, and channel migration or diversion flood-causing mechanisms and the combined-effect flood H.4.1 (from Appendix H of Reference 3) were either determined to be implausible or completely bounded by other mechanisms. Some individual flood-causing mechanisms (i.e. surge and seiche) are addressed in one or more of the combined-effect floods.

1. Local Intense Precipitation (LIP)

The maximum reevaluated flood elevation (710.81 feet MSL) is not bounded by the design basis flood elevation (710.1 and 710.3 feet MSL). The associated effects and flood event duration parameters are also not bounded. The design basis flood is below the lowest opening to structures, systems, and components (SSCs) important to safety so these effects and parameters are not addressed in the Current Licensing Basis (CLB). Note that the supporting analysis is based on a 2-dimensional model for the LIP flood. Therefore, the calculated flood elevations vary around the plant.

2. Combined-Effect Flood in Section H.1, Reference 3, Floods Caused by Precipitation Events for the Cooling Pond

Section H.1, Reference 3, presents three alternative precipitation-event combinations that were evaluated for the cooling pond watershed. The maximum reevaluated stillwater elevation (705.68 feet MSL) is not bounded by the design basis stillwater elevation (704.3 feet MSL). Similarly, the maximum reevaluated wind-wave runup elevation (707.33 feet MSL) is not bounded by the design basis wind-wave runup elevation (705.6 feet MSL). Note that the nominal plant grade elevation is 710.5 feet MSL and the minimum top of the cooling pond peripheral road, preventing water from overtopping during the Probable Maximum Flood (PMF), is elevation 705.7 feet MSL.

Table 4.0.3 in Enclosure 1 addresses other associated effects. Flood event duration parameters are not applicable to this combined-effect flood since manual actions are not credited in the CLB with providing protection SSCs important to safety at the reevaluated flood levels.

3. Combined-Effect Flood in Section H.4.2, Reference 3, Floods along the Shores of Enclosed Bodies of Water for the Cooling Pond (Streamside Locations)

Section H.4.2, Reference 3, presents three alternatives (streamside locations) for flooding along shores of enclosed bodies of water that considers the combined-effects of precipitation-induced flooding, surge/seiche, and wind-wave runup. The maximum reevaluated stillwater elevation (701.02 feet MSL) for the prevailing alternative (Alternative 3) is bounded by the design basis stillwater elevation (704.3 feet MSL). However, the maximum reevaluated wind-wave runup elevation (710.55 feet MSL and 712.04 feet MSL at the lake screen house and CSCS inlet structure, respectively) for the prevailing alternative is not bounded by the design basis wind-wave runup elevation (705.6 feet MSL). Table 4.0.4 in Enclosure 1 addresses other associated effects. Flood event duration parameters are not applicable since manual actions are not credited in the CLB with providing protection at SSCs important to safety.

d. Interim evaluation and actions taken or planned to address any higher flooding hazards relative to the design basis, prior to completion of the integrated assessment described below, if necessary.

Response:

Integrated Assessment Trigger and Plan

Per Enclosure 2 of Reference 1, an Integrated Assessment is required for plants where the current design basis floods do not bound the reevaluated hazard for all flood causing mechanisms. Reference 4 presents four approaches for performing an Integrated Assessment based on the results of the flood hazard reevaluation.

- Scenario 1 - Reevaluated Hazard Bounded by Design Basis
- Scenario 2 - Only Local Intense Precipitation
- Scenario 3 - All Permanent and Passive Flood Protection
- Scenario 4 - Integrated Assessment Required

An Integrated Assessment is not necessary in Scenario 1. Limited evaluations can be conducted and submitted with the Flood Hazard Reevaluation Report under Scenarios 2 and 3 that only address specific sections of the Integrated Assessment Interim Staff Guidance (Reference 5). Licensees in Scenario 4 and those not including limited evaluations in the Flood Hazard Reevaluation Report under Scenarios 2 and 3 are required to perform a full Integrated Assessment.

Per “Part c” above, the design basis flood does not bound the reevaluated hazard for all applicable flood-causing mechanisms and combined-effect floods. Specifically, local intense precipitation and combined-effect flood combinations H.1 and H.4.2 were not bounded by the design basis flood hazard. Therefore, LaSalle County Station plans to prepare a full Integrated Assessment (Scenario 4).

Interim Evaluation and Actions Taken or Planned

Cases where the design basis floods do not bound the reevaluated hazard for all applicable flood-causing mechanisms also require an interim evaluation and description of actions taken or planned to address any higher flooding hazards prior to completing the Integrated Assessment. The following summarizes the interim evaluations and actions taken or planned.

The following planned actions address the impacts of the H.1 and H.4.2 combined-effect floods and associated effects on the lake:

- Evaluation of the effects of higher waves and associated loads on the lake screen house concrete structure and CSCS inlet concrete structure from PMF/surge/seiche/waves is currently in progress. This evaluation will consider the total load on the structure including wave impact and hydrostatic. Debris and drag loads are considered negligible for structures within the lake.
- Identify any unsealed penetrations up to the reevaluated stillwater elevation to address potential surcharge of groundwater levels due to increase stillwater levels in the lake.

- Evaluation of the hydrostatic loading on the power plant foundations using groundwater level at the reevaluated stillwater elevation.

The following actions planned address the effects of the LIP event:

- Inspection of existing sealant on plant doors 479, 554, and 508 and fix as needed.
- Determine which doors/openings are not used and should have barrier/sealant applied to them as a permanent passive flood protection feature. Determine type of sealant and elevation at which the sealant should be applied.
- Identify temporary or permanent flood protection features (e.g. berm/barriers), including installation and staging requirements, at doors/openings that are frequently used and where water ingress cannot be mitigated by other means. Consideration shall be for barriers that can be driven or walked over. Barriers shall not impede or negatively impact safety or security functions.
- Evaluate the effects of ingress of water from the LIP event on the plant, with respect to the following subareas:
 - a. Evaluate the building structures and doors for the amount of inleakage over the duration of the event, how the buildings handle the volume of water, and how it can be routed to the turbine building (TB) and Offgas basements/old service Bldg/technical support center/tube pull area, including the effect of impact pressure of the moving water on the plant buildings.
 - b. Determine the capacity of the existing multiple local floor drains that would intercept water prior to reaching any plant safety-related equipment areas and determine which floor drains to inspect/clean.
 - c. Determine if/how the leakage through the doors affects equipment important to safety, including differences between winter and summer requirements. If necessary to support plant work during winter months (outage), berms/barriers may not be required if it can be shown that winter LIP is much less than all-season LIP and will not exceed door thresholds.
 - d. Evaluate procedure LOA-FLD-001 (Reference 7) for possible enhancements to improve mitigation of the reevaluated LIP flood.
 - e. Prioritizing actions for high risk areas.
- Determine if additional doors need to be surveyed and perform survey if necessary.
- Evaluate the need for signs on the doors with barriers (e.g. caulk, berm, sandbag, sheet metal, etc.) to identify them as a flood protection feature.
- Revise procedure LOA-FLD-001 (Reference 7) to incorporate changes based on input from Design Engineering evaluations and determinations.

- Determine training needs for new flood equipment and conduct training as applicable using the Systematic Approach to Training (SAT).
- Demonstrate/simulate new operator manual actions required by procedure LOA-FLD-001 (Reference 7) can be performed within the timeframe per NEI 12-07 (Reference 8).
- Install barrier/sealant for doors that do not currently have it installed.
- Stage flood protection equipment (e.g. berm material) and/or post signs as required.
- Inspect/clean floor drains as required.

e. Additional actions beyond Requested Information item 1.d taken or planned to address flooding hazards, if any.

Response:

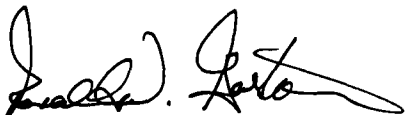
- None required.

A list of regulatory commitments contained in this letter is provided in Enclosure 3.

If you have any questions regarding this submittal, please contact Ron Gaston at (630) 657-3359.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 12th day of March 2014.

Respectfully submitted,



Ronald W. Gaston
Manager - Licensing & Regulatory Affairs
Exelon Generation Company, LLC

Enclosures:

1. LaSalle County Nuclear Generating Station, Flood Hazard Reevaluation Report, Revision 0
2. CD-R labeled: “LaSalle County Station, Pertinent Site Data for Flood Hazard Reevaluation Submittal”

Document Components:

Pertinent Site Data (requires AutoCAD or similar program)

3. Summary of Regulatory Commitments

cc: Director, Office of Nuclear Reactor Regulation (w/o Enclosure 2)
Regional Administrator – NRC Region III (w/o Enclosure 2)
NRC Senior Resident Inspector – LaSalle County Station
NRC Project Manager, NRR – LaSalle County Station
Mr. G. Edward Miller, NRR/DORL/LPL2-1, NRC
Illinois Emergency Management Agency - Division of Nuclear Safety (w/o Enclosure 2)